

湖北宜都艾氏魚 (*Knightia*) 的发现及其意义

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在本文中描述的魚化石是石油工业部地质勘探处 105 队顾信章同志送来的,系采自湖北宜都城南香河岩至洋溪坳剖面下部的蓝灰色頁岩中(属于东湖系),据剖面岩性描述,似属于“东湖羣”上部。

香河岩至洋溪坳产魚化石地点剖面¹⁾: (自上而下)

第四系: 砂砾层

~~~~~ 不整合 ~~~~~

下第三系

剖面厚約 232 米

- |                                               |        |
|-----------------------------------------------|--------|
| 30. 紫紅色粉砂岩, 含砾石, 微斜层理发育                       | 10 米   |
| 29. 深灰、灰白色灰岩, 产介形类、腹足类化石                      | 1.75 米 |
| 28. 灰紫、灰綠色粉砂岩                                 | 2.50 米 |
| 27. 灰紫、灰黃色泥岩, 产介形类、腹足类化石                      | 1 米    |
| 26. 浅紫色泥岩夹灰綠色粉砂岩                              | 5 米    |
| 25. 紫紅、灰綠色砂岩, 含鈣质結核                           | 6 米    |
| 24. 灰紫、淡黄、灰綠色泥岩, 产介形类化石                       | 1.5 米  |
| 23. 紫紅、灰綠色砂岩, 含鈣质結核                           | 25 米   |
| 22. 紫紅色砂质泥岩夹有砾石层                              | 25 米   |
| 21. 掩复                                        | 約 5 米  |
| 20. 灰紫色角砾岩                                    | 5 米    |
| 19. 掩复                                        | 約 10 米 |
| 18. 浅紫、浅綠色泥岩夹泥灰岩透鏡体                           | 7 米    |
| 17. 紫紅色砂质泥岩                                   | 8 米    |
| 16. 灰紫色細砾岩夹紫紅色泥质砂岩                            | 3 米    |
| 15. 灰紫色角砾岩                                    | 12 米   |
| 14. 灰白色泥岩夹有鈣质結核                               | 15 米   |
| 13. 浅紫、灰綠色粉砂岩                                 | 7 米    |
| 12. 紫紅色砂质泥岩夹有泥灰岩、鈣质結核、局部夹有細砾                  | 7 米    |
| 11. 紫紅色粉砂岩                                    | 5 米    |
| 10. 紫紅、灰綠色砂质頁岩                                | 3.5 米  |
| 9. 紫紅色泥灰岩夹褐黃色頁岩, 产介形类化石                       | 2.5 米  |
| 8. 蓝灰色頁岩, 产魚 ( <i>Knightia</i> )、腹足类和植物(碎片)化石 | 0.75 米 |
| 7. 紫紅、灰綠色粉砂岩                                  | 4 米    |

1) 依105队的剖面, 略加修改。

6. 灰白、灰紫色泥灰岩夹有钙质结核..... 8.5 米
5. 紫红色粉砂岩夹泥灰岩 ..... 8 米
4. 灰白色泥灰岩, 产介形类化石..... 2 米
3. 灰紫、灰白色泥岩夹有钙质结核..... 9 米
2. 褐黄色砂质泥岩夹细砂岩, 含细砾..... 2 米
1. 灰黑、紫红色角砾岩, 角砾为灰岩组成, 砾径变化极大..... 30 米

~~~~~ 不整合 ~~~~~

奥陶系: 灰白、灰色厚层状灰岩。

标本记述

鲱形目 *Clupeiformes*

鲱目 *Clupeidae*

艾氏鱼属 *Knightia* Jordan, 1907

渔洋艾氏鱼 *Knightia yuyanga*, sp. nov.

(图版 I, 图 1)

标本: 一不整个体, 尾部缺失, 鳍也有缺失, 仅存有部分背鳍和胸鳍。标本登记号 V. 2689。

产地和时代: 湖北宜都城西南约 3.5 公里过路滩。始新世(中、晚期)。

特征: 体梭形, 背部较平直, 腹缘不甚隆凸。背鳍位置较靠后。背稜鳞(Dorsal scutes) 较狭长, 沿中脊向前延伸, 形成棘突, 相当硕壮。腹稜鳞的前部侧翼发达, 翼肋(Wing-rib) 长大, 约相等于是肋骨长的一半; 腹稜鳞后部有向后下方突伸的棘突, 较为粗壮。

标本描述: 为一保存不完整的, 体长约 100 毫米的小鱼。头部由于压挤, 已有错动, 但尚可辨认部分骨骼的轮廓与相互位置。头中等大, 头长大于头高, 头高小于体高。脊柱后部缺失, 共约保存 30 个脊椎。最前端的几个脊椎, 由于受压挤, 随同头部略向前下方弯曲。估计该鱼可有 35 个左右脊椎, 椎体长大于其高, 神经棘发达, 背鳍前方的神经棘末梢未愈合。肋骨长, 约计 18 对, 均伸达腹缘。在背鳍之前有一列背稜鳞, 部分缺失, 只保存 6 个, 现可看到左侧部分, 也就是全稜鳞的一半, 略呈钝三角形, 整个背稜鳞呈前后伸长的菱形(图 1-3), 长颇大于宽, 前角比后角突伸显著, 边缘皆圆滑, 无锯齿。这种背稜鳞形状与 *Knightia eocaena* 和 *K. alata* 的有些近似。

腹缘不显隆凸, 在前部保存有 14 个腹稜鳞, 它们构成坚固的腹脊(Ventral keel), 腹稜鳞前部有向两侧伸展的侧翼(Lateral wings), 每个翼叶(Wing-lobe) 中间有一根翼肋, 相当长大, 几伸达相对腹肋的中点, 即其长等于肋骨长的二分之一。腹稜鳞后部为一向后下方延伸的棘刺, 相当硕壮, 以靠近腹鳍的保存较好, 密集排列(图版 I, 1)。

胸鳍只保存有鳍基的一小部分, 鳍条全部缺失, 位置较靠下。腹鳍未保存。背鳍保存不完全, 仅在前部留存有少许鳍条, 且已残缺, 也折向前方, 可看出鳍条分节稀疏, 节长大于节宽。在背鳍下方可见到 14 根支持骨, 较为细弱。由支持骨的数目推断该种鱼的背鳍条数约为 16 根左右。臀鳍未保存, 由体形和各部分的关系看, 估计臀鳍不会很长。鳞片没

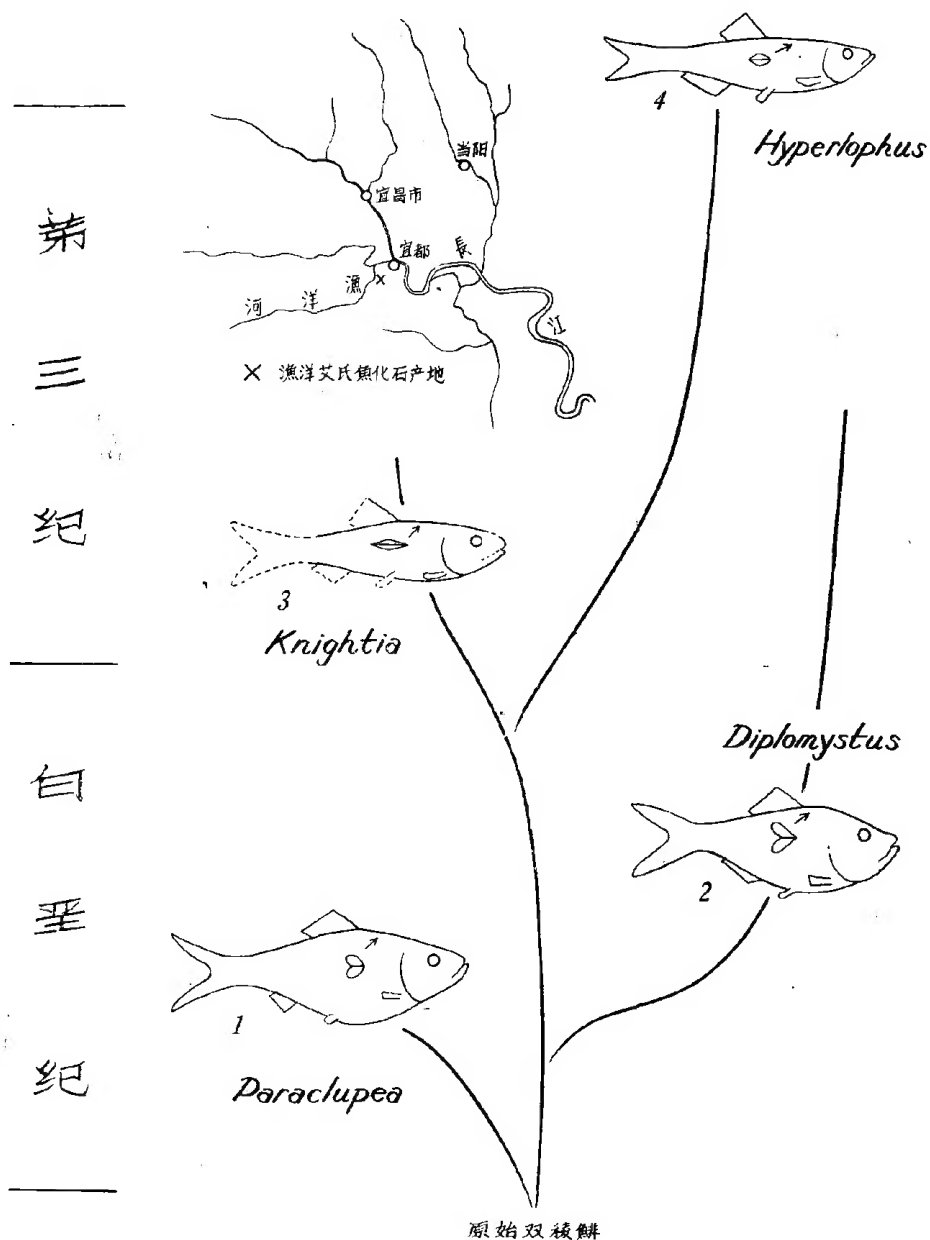


图 1 双稜鲱系统树简图

A simplified diagram showing the relationship of Double-armoured clupeids.

1. *Paraclupea cheungensis*, 2. *Diplomystus brevissimus* (Schaeffer, 1947), 3. *Knightia yuyanga*, 4. *Hyperlophus* (Schaeffer, 1947).

有保存, 形状不明。

比較和討論: 艾氏魚 (*Knightia*) 属名系 Jordan 氏以 *Clupea humilus* Leidy (1873) 为代表而建立的一个属 (1907)。在此以前, 有关这一类的魚化石都被列入 *Diplomystus* 属中。艾氏魚与后者的区别除背稜鳞形状 (长大于宽) 不同外, 还有以下几点: (1) 身体較

长, (2) 口裂不十分倾斜, (3) 鳞片较大 (约 35 列, 在后者可达 60 列以上), (4) 臀鳍较短, (5) 脊椎数目少 (35 个左右) 等。虽然宜都的标本不够完整, 有些特征不能观察, 但由所显示的特征看, 无疑是属于艾氏鱼这一类型。

宜都的标本, 从体形上看与 *Knightia eocaena* Jordan 有些近似 (参看图版 I, 2), 背稜鳞的形状也很与之相象。不过我们宜都的标本, 背稜鳞较为窄长, 后角也较为伸长。腹稜鳞又较大, 翼肋较长, 以及背鳍的位置也比较靠近尾端等, 均与之有所区别。今订名为渔洋艾氏鱼 (*Knightia yuyanga*, sp. nov.), 种名系表示化石产地靠近渔洋河。

Knightia eocaena 是北美绿河页岩 (Green River Shales, Eocene) 中常见的一种双稜鲱, 渔洋艾氏鱼与之多所相似, 同时在湖北宜都一带还没有发现其他更原始性的种类, 故可认为含有渔洋艾氏鱼的地层, 其时代应与北美绿河页岩的时代大致相当。另考虑到该种鱼的一些特征, 如背稜鳞形状窄而长, 体形也趋长等, 从双稜鲱体形的变化趋势讲, 恐该种鱼的生存时代略晚, 但至迟不晚于始新世晚期。

艾氏鱼化石过去只发现于美洲 (Schaeffer, 1947), 今在我国也有发现, 证明其地理分布不仅限于美洲, 在欧亚大陆上也有分布。此外, 关于双稜鲱的化石, 除上述种属外, 还有在浙江临海一带发现的浙东后鲱鱼 (*Paraclupea chetungensis* Du) (图 1-1)。后者的性质, 与 *Diplomystus* 和 *Knightia* 都有相似之处, 它代表着与前两属的共同祖先相近枝系的一成员 (孙, 1956)。如以背稜鳞的形状论, *Paraclupea* 与 *Diplomystus* 更为相近, 不过后者的背稜鳞更宽大一些。

双稜鲱的现生代表, 如 *Hyperlophus*, *Potamalosa* 和 *Ethmidium* 分布于澳洲和南美的河流及近海岸。艾氏鱼与 *Hyperlophus* 有些接近 (Schaeffer, 1947)。渔洋艾氏鱼在体形上和背稜鳞形状上都更与 *Hyperlophus* 相近似, 这说明它们之间的关系密切, 这一点由地区分布上也可以解释。我国湖北艾氏鱼的发现, 给探讨双稜鲱的地史地理分布, 以及其系统关系提供了新资料。

当第三纪时, 我国南部有较广泛的河湖相沉积, 由于过去在该套沉积层中发现的化石少, 因而在地层时代的划分上意见很不一致。近几年在一些地区的可能属于同一类型的沉积层中, 发现了较多的脊椎动物化石和微体生物化石。著者曾根据湖南洞庭湖周围地区所发现的鱼化石性质, 认为这套含鱼化石的地层为始新世到渐新世初期的沉积。如在湖南临澧孙家桥组中发现有骨唇鱼 (*Osteochilus*) 和洞庭鲈 (*Tungtingichthys*) 等化石, 这一鱼群的性质与印度尼西亚中苏门答腊的“泥灰质页岩系” (Mergelschiefer) 中的鱼群性质相近 (刘等, 1962); 继在湖南湘乡下湾铺组中除产有与临澧相同的种属外, 更发现了剑鲈 (*Aoria*) (郑, 1962), 剑鲈也存在于印尼中苏门答腊的“泥灰质页岩系中”, 这更进一步说明两地鱼群的相似性。最近在湖北当阳东岳庙一带也发现了骨唇鱼化石, 且与湖南临澧的是同一种, 更加证明了这一带含鱼化石地层的关系, 可以对比。

此外, 过去在湖北洋溪曾发现了真恐角兽 (*Eudinoceras* cf. *khlobolchiensis* Osb. & Gr.), 这也是对上述含鱼地层属于始新世的佐证。据近年来地质部门对湖北宜昌一带红层的古地磁研究结果, 也认为其地质时代为早第三纪, 这全是说明湖北宜昌一带有早第三纪地层的看法, 有一定的道理。

据知艾氏鱼化石发现于湖泊相 (北美) 及河口相 (南美) 沉积中, 今由宜都含鱼化石

地层的岩性表明,当时的沉积环境与北美等地的含鱼层所显示的有相似性。又湖北当阳、湖南临澧一带的含鱼化石沉积也很相似,加上鱼化石本身的相似,皆说明这些盆地当时可能互相联通,湖盆中的水质或略咸一些。另依据与这些化石鱼属于同一类的现生代表,现多分布于偏南地区,如与艾氏鱼同一类的现生种, *Hyperlophus*, *Potamalosa* 和 *Ethmidium* 生存于澳洲、南美智利等地;骨唇鱼今分布于印度尼西亚、缅甸等地,在以北地区多见于化石记录。这种现象表明当始新世时,两湖地区的气候与现今有所不同,应是相当温暖的,这一点当著者研究临澧鱼化石时曾指出了,今由艾氏鱼的研究结果,也得到同样结论。

更有意思的是:从化石种属产地的沉积物所反映的生活环境与现生代表的生活环境是类似的,此点说明双稜鲱的生活习性在较长时期内无大变化。

值得注意的是:近几年在广东、江西等地的早第三纪地层中也找到了较多的鱼化石,从鱼化石本身,以及沉积物的性质,也与两湖地区有一定的相似性,说明当沉积时各盆地有一定联系。因此,进一步的区域古生物工作将对恢复华南地区第三纪古地理及地层对比提供更多的依据。

最后,著者对 105 队顾同志将鱼化石送交我们研究,并提供地层资料;周明镇、刘东生和郑葆珊先生对本工作提供宝贵意见与帮助,在此一并致以谢意。

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THE DISCOVERY OF DOUBLE-ARMOURED HERRINGS FROM ITU, HUPEI

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This species of herring is represented by an imperfect specimen, and possesses well-marked characters. The fossil was found by Mr. Ku Hsin-chang from a probably Tertiary formation near the right bank of Yüyang River, south-west of Itu city, and was stated to have been derived from a thin layer of bluish gray shale (0.75 metres), which abounds in ostracods. Based on the characters of its dorsal scutes the fossil herring belongs to the genus *Knightia*. It is described in the following pages under the appellation of *Knightia yuyanga*, indicating the fossil locality near Yüyang River.

DESCRIPTION OF SPECIMEN

Order Clupeiformes

Family Clupeidae

Genus *Knightia* Jordan, 1907

Knightia yuyanga, sp. nov.

Type: An imperfect fish, Cat. No. V.2869 of IVPP.

Horizon and Locality: Middle to Upper Eocene; Kuolutan, 3.5 kilometres south-west of Itu city, Hupei.

Characters: An elongate-bodied species of small size, outline of body resembling *K. eocaena*, and inferior profile not especially prominent. Abdominal vertebrae about eighteen in number. Dorsal scutes not wider than long, with a single anteriorly produced tooth, which connected with median longitudinal carina. Ventral scutes rather robust, forming a strong spine posteriorly and broad lateral wings anteriorly. Dorsal fin remote than in *K. eocaena*.

Description: This unique specimen is imperfect in the caudal region, the ventral and anal fins are not preserved, only a part of the pectoral and dorsal fins are present. The proportions of the fish cannot be given, but the general form of the fish is seen to be exactly as above described. Some of the bones of skull are displaced from their original position by crushing, only the outline of them can be seen. Head is moderate in size, its length is somewhat larger than its maximum depth, which is less than the depth of body.

The vertebral column, except the caudal portion, is clearly shown. There are about 18 abdominal vertebrae, while the number of caudal is no less than 12. Ribs are long, extend to the ventral border and are in contact with the wing rib of ventral scutes. The neural arches are fused with the vertebral centra, the neural spines of each arch are not fused together before the dorsal. There are traces of delicate intermuscular bones

in the dorsal region. Some of the caudal vertebrae were displaced and incomplete. The caudal fin is not preserved.

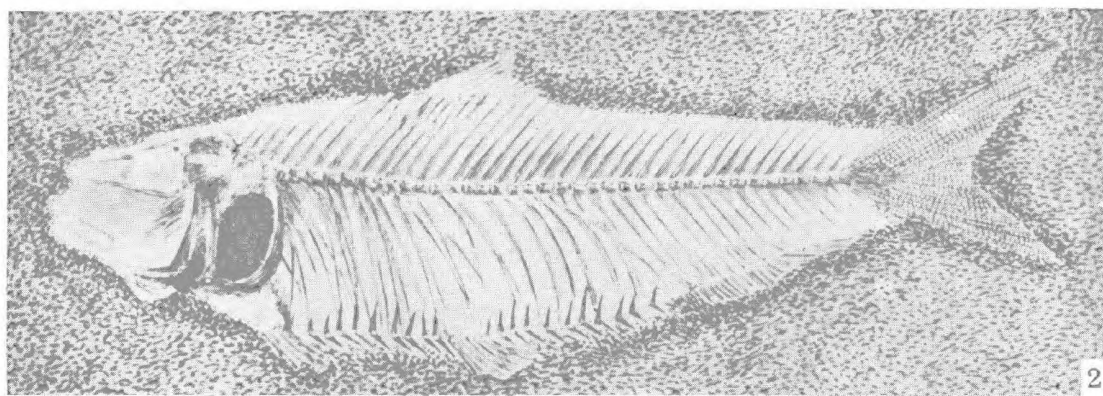
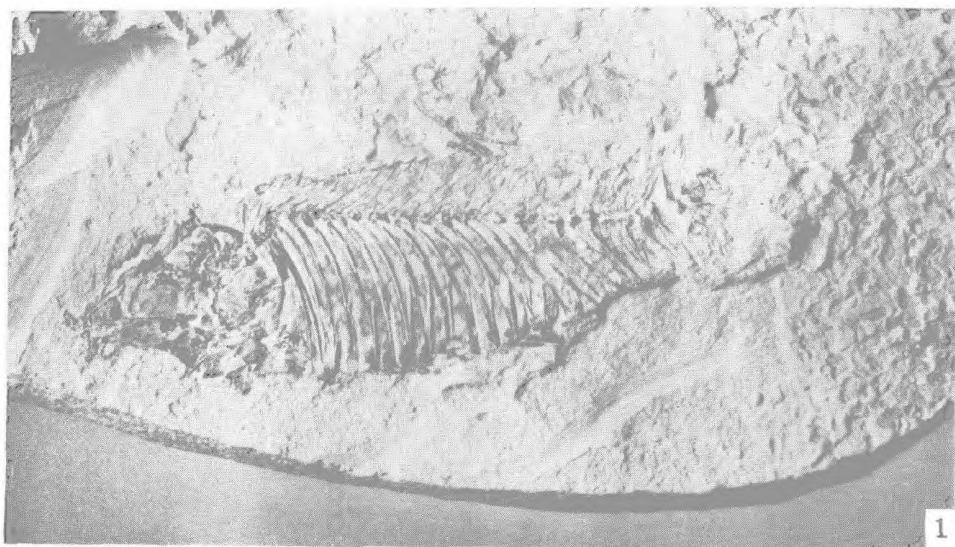
The pectoral fin is imperfect, only traces of proximate end can be observed. The origin of dorsal fin arises behind the middle of the back. Only three rays can be observed, but about 14 inner supports are shown. The dorsal scutes are well shown, its length is longer than its width, and with long process anteriorly, with short smooth process posteriorly. There are about 13 dorsal scutes in series between the occiput and the dorsal fin. They are supported by a series of bones like the supports of the median fins. Ventral scutes are robust and nearly regular in size. Each exhibits a strong posteriorly directed spine, which is apparently smooth, and expands laterally to form wings anteriorly. There is a long and strong wing rib in each of the wing lobe, and reaching the middle point of the ventral rib, so that the ventral keel of the fish is very compact. There are about 15 ventral scutes seen in this specimen (Pl. I, 1). The flank scales are not preserved.

Remarks: The specimen described above is similar to *K. eocaena* in body form, but is clearly distinguished from the latter species by its dorsal scutes, which is more elongated posteriorly, and each lateral wing of ventral scute possesses a long wing rib. This kind of ribs extends upwards to the middle point of the corresponding ventral ribs. Therefore the present author considers that the Itu specimen represents a new species.

On the other hand, *Knightia yuyanga* possesses characters of both *K. eocaena* and the recent representative, *Hyperlophus*. Therefore it might be stratigraphically somewhat later than that of *K. Eocaena*, and flourished during Late Eocene. It is very possible that *Hyperlophus* has a close relationship with this form.

To date, two kinds of double-armoured herrings have been discovered in China, namely, *Paraclupea* and *Knightia*. Judging from the characteristics of *Paraclupea*, it represents a primitive member which had a close affinity with the ancestor of *Diplomystus* and *Knightia* probably.

On the evidence furnished by the fish remains from Hunan and Hupei regions, the present author considers that the fish-bearing strata outcropped around Tungting Lake may correspond each other in geological age and the climate in Central China was rather warm during the Old Tertiary time.



1. 漁洋艾氏魚 (*Knightia yuyanga*, sp. nov.), 正型标本 (V. 1052), 左側視, $\times 3$.
2. 北美綠河頁岩系中的 *Knightia eocaena* Jordan.
Knightia eocaena Jordan, from Green River Shales of Wyoming (After Jordan, 1910).